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PRELIMINARY REPORT
INDUSTRY SERIES

1987 Census of Manufactures

MC87-I-36A(P)
Issued August 1989

ELECTRICAL TRANSMISSION AND DISTRIBUTION EQUIPMENT AND ELECTRICAL INDUSTRIAL APPARATUS

Industries 3612, 3613, 3621, 3624, 3625, and 3629

INTRODUCTION

This report presents preliminary statistics from the 1987 Census of Manufactures for those establishments classified in the industries listed above. These data will be superseded by a more comprehensive final paperbound report. The method of data collection and use of administrative data are discussed in detail in the appendix.

All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The definitions of these industries are the same as those used in the 1987 Standard Industrial Classification (SIC) Manual.[1]

INDUSTRY 3612, TRANSFORMERS, EXCEPT ELECTRONIC

In the 1987 Census of Manufactures, Industry 3612, Transformers, Except Electronic, had employment of 32.0 thousand. The employment figure was 18 percent below the 39.0 thousand reported in 1982. Compared with 1986, employment in 1987 decreased 7 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

The total value of shipments for establishments classified in this industry was $3.3 billion. The products primary to this industry appear in table 2 and aggregated to $3.1 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $1.6 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3613, SWITCHGEAR AND SWITCHBOARD APPARATUS

In the 1987 Census of Manufactures, Industry 3613, Switchgear and Switchboard Apparatus, had employment of 44.3 thousand.

The total value of shipments for establishments classified in this industry was $5.0 billion. The products primary to this indusstry appear in table 2 and aggregated to $4.7 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $2.0 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3621, MOTORS AND GENERATORS

In the 1987 Census of Manufactures, Industry 3621, Motors and Generators, had employment of 74.7 thousand. The employment figure was 11 percent below the 84.2 thousand reported in 1982.

The total value of shipments for establishments classified in this industry was $6.9 billion. The products primary to this industry appear in table 2 and aggregated to $7.0 billion in 1987.

[1] **Standard Industrial Classification Manual: 1987.** For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Stock No. 041-001-00314-2.

Address inquiries to Bureau of the Census, Industry Division, Washington, DC 20233, or call **Raphael S. Corrado** (301) 763-7304.

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The cost of materials and services used by establishments in this industry amounted to $3.1 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3624, CARBON AND GRAPHITE PRODUCTS

In the 1987 Census of Manufactures, Industry 3624, Carbon and Graphite Products, had employment of 10.4 thousand. The employment figure was 13 percent below the 12.0 thousand reported in 1982.

The total value of shipments for establishments classified in this industry was $1.3 billion. The products primary to this industry appear in table 2 and aggregated to $1.2 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $620.7 million in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3625, RELAYS AND INDUSTRIAL CONTROLS

In the 1987 Census of Manufactures, Industry 3625, Relays and Industrial Controls, had employment of 66.5 thousand.

The total value of shipments for establishments classified in this industry was $6.1 billion. The products primary to this industry appear in table 2 and aggregated to $6 0 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $2.3 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3629, ELECTRICAL INDUSTRIAL APPARATUS, N.E.C.

In the 1987 Census of Manufactures, Industry 3629, Electrical Industrial Apparatus, N.E.C., had employment of 14.7 thousand. The employment figure was 10 percent below the 16.3 thousand reported in 1982.

The total value of shipments for establishments classified in this industry was $1.2 billion. The products primary to this industry appear in table 2 and aggregated to $1.2 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $495.0 million in 1987. Data on specific materials consumed appear in table 3.

ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used in the tables in this publication:

-	Represents zero.
(D)	Withheld to avoid disclosing data for individual companies; data are included in higher level totals.
(NA)	Not available.
(NC)	Not comparable.
(S)	Withheld because estimate did not meet publication standards on the basis of either the response rate or a consistency review.
(X)	Not applicable.
(Z)	Less than half the unit shown.
do	Ditto.
n.e.c.	Not elsewhere classified.
n.s.k.	Not specified by kind.
pt.	Part.
r	Revised.
SIC	Standard Industrial Classification.

Other abbreviations, such as lb, gal, yd, doz, bbl, and s tons, are used in the customary sense.

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Import/Export Publications	Foreign Trade Division	(301) 763-5140
Industry Analysis and Forecasts	International Trade Administration	(202) 377-4356

Table 1. Historical Statistics for the Industry: 1987 and Earlier Years

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendix.]

Year[1]	Companies[2] (no.)	All establishments[3] Total (no.)	All establishments[3] With 20 employees or more (no.)	All employees Number (1,000)	All employees Payroll (million dollars)	Production workers Number (1,000)	Production workers Hours (millions)	Production workers Wages (million dollars)	Value added by manufacture[4] (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	End-of-year inventories[4] (million dollars)	Ratios Specialization (percent)	Ratios Coverage (percent)
INDUSTRY 3612, TRANSFORMERS, EXCEPT ELECTRONIC															
1987 Census	(NA)	284	153	32.0	713.9	24.3	46.5	467.8	1 601.7	1 649.4	3 270.2	65.4	473.4	(NA)	(NA)
1986 ASM	(NA)	(NA)	(NA)	34.3	746.7	25.9	48.4	494.6	1 591.8	1 674.8	3 298.4	66.2	519.4	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	35.3	752.1	26.6	49.5	492.5	1 558.4	1 721.4	3 288.5	79.1	541.6	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	37.1	761.4	28.3	52.7	501.8	1 534.1	1 686.1	3 170.3	82.8	571.9	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	36.6	708.0	27.1	49.8	456.6	1 397.3	1 425.3	2 867.0	63.2	500.8	(NA)	(NA)
1982 Census	240	293	162	39.0	732.1	28.5	51.3	461.0	1 439.1	1 421.8	2 916.0	76.5	537.2	94	96
1981 ASM	(NA)	(NA)	(NA)	45.9	771.7	34.4	65.5	502.1	1 578.1	1 665.7	3 208.8	80.5	513.1	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	44.9	705.2	33.7	65.7	468.4	1 440.6	1 500.5	2 957.4	83.6	456.0	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	46.6	649.1	35.9	68.0	437.8	1 414.6	1 351.3	2 728.7	72.6	470.9	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	44.6	596.0	34.0	63.9	395.6	1 280.7	1 193.7	2 451.6	67.0	419.6	(NA)	(NA)
1977 Census	229	279	143	43.3	529.6	32.8	62.5	349.8	1 162.7	1 061.8	2 201.6	67.2	385.8	95	97
1976 ASM	(NA)	(NA)	(NA)	38.8	437.4	28.9	53.2	285.1	939.7	872.9	1 812.0	32.6	326.4	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	40.3	444.7	29.7	56.2	290.4	916.6	854.6	1 805.2	35.2	321.9	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	49.6	500.6	38.4	75.3	353.7	1 006.4	1 009.5	1 974.5	47.2	385.6	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	50.7	466.4	39.8	78.4	326.4	890.2	804.0	1 663.1	36.4	319.6	(NA)	(NA)
1972 Census	168	216	136	46.8	420.2	35.6	71.3	286.1	757.3	700.5	1 461.9	26.8	258.7	96	97
INDUSTRY 3613, SWITCHGEAR AND SWITCHBOARD APPARATUS[5]															
1987 Census	(NA)	464	252	44.3	1 056.0	29.2	57.0	592.6	2 954.3	1 961.0	4 964.4	120.6	745.3	(NA)	(NA)
INDUSTRY 3621, MOTORS AND GENERATORS															
1987 Census	(NA)	458	298	74.7	1 674.3	56.4	109.9	1 103.6	3 861.4	3 088.5	6 918.8	212.5	1 153.2	(NA)	(NA)
1986 ASM	(NA)	(NA)	(NA)	75.6	1 681.7	55.5	108.1	1 081.9	3 623.4	2 921.1	6 508.1	232.7	1 138.0	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	77.6	1 648.9	57.8	112.1	1 098.4	3 668.1	2 888.7	6 583.6	252.5	1 183.4	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	84.2	1 743.5	63.3	124.5	1 148.0	3 929.3	2 915.7	6 760.5	244.9	1 254.6	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	80.4	1 555.0	60.1	114.4	1 003.8	3 372.5	2 647.7	6 002.0	204.6	1 145.6	(NA)	(NA)
1982 Census	349	472	325	84.2	1 546.4	61.0	114.4	984.2	3 435.8	2 526.4	6 060.1	275.4	1 087.9	94	81
1981 ASM	(NA)	(NA)	(NA)	93.4	1 608.5	70.3	137.0	1 089.3	3 634.7	2 747.4	6 316.4	235.8	1 049.4	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	94.1	1 478.9	69.6	136.6	987.9	3 119.1	2 503.3	5 648.2	183.2	984.8	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	107.1	1 512.1	81.7	161.1	1 036.8	3 279.7	2 552.4	5 728.3	176.9	1 035.4	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	106.1	1 370.3	82.0	160.2	941.5	2 963.4	2 281.6	5 185.5	176.7	896.6	(NA)	(NA)
1977 Census	340	446	298	96.9	1 176.7	74.1	149.7	802.1	2 609.9	1 915.9	4 458.7	160.9	770.3	92	80
1976 ASM	(NA)	(NA)	(NA)	90.7	1 009.1	70.7	137.2	691.7	2 194.8	1 601.8	3 726.5	131.5	638.1	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	82.0	850.9	60.6	118.7	567.6	1 719.4	1 364.1	3 137.2	94.3	547.5	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	100.2	957.7	77.7	152.5	654.1	1 923.6	1 553.0	3 383.3	117.9	679.1	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	100.6	900.8	79.0	156.9	630.0	1 720.6	1 295.0	2 989.0	85.3	565.1	(NA)	(NA)
1972 Census	325	426	258	90.3	764.4	69.2	139.3	516.9	1 475.2	1 054.8	2 501.7	58.9	466.8	91	81
INDUSTRY 3624, CARBON AND GRAPHITE PRODUCTS															
1987 Census	(NA)	99	67	10.4	273.2	7.3	15.5	171.5	621.1	620.7	1 253.9	47.8	398.8	(NA)	(NA)
1986 ASM	(NA)	(NA)	(NA)	9.3	240.3	6.6	13.5	152.0	508.9	587.7	1 136.3	38.5	360.7	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	10.2	260.8	7.3	15.2	168.5	379.4	633.8	1 120.6	52.3	406.3	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	11.4	276.5	8.3	17.2	182.0	584.6	655.9	1 222.8	68.9	520.9	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	10.8	246.1	7.5	15.2	151.4	476.9	446.9	994.6	125.0	504.4	(NA)	(NA)
1982 Census	70	90	59	12.0	258.2	8.4	16.6	164.8	550.1	463.3	971.4	151.8	600.1	94	93
1981 ASM	(NA)	(NA)	(NA)	13.0	256.8	9.6	19.2	171.2	799.3	717.1	1 360.6	144.8	484.9	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	13.3	241.9	9.7	19.4	166.0	661.0	544.5	1 183.3	86.4	291.5	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	13.3	223.8	10.0	20.2	157.8	644.2	524.5	1 145.2	43.1	259.7	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	12.5	183.3	9.5	18.8	128.7	499.1	393.7	890.6	33.5	222.5	(NA)	(NA)
1977 Census	58	74	48	12.1	164.1	9.0	17.7	110.9	408.4	337.5	735.2	35.4	215.9	94	93
1976 ASM	(NA)	(NA)	(NA)	12.0	152.8	8.9	16.8	102.2	399.3	339.1	691.4	63.3	211.4	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	11.3	128.5	8.3	15.6	86.4	375.1	244.9	594.2	61.1	154.0	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	12.6	134.9	9.6	19.3	96.6	342.5	276.5	613.0	22.1	123.8	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	12.2	115.8	9.5	19.2	84.6	264.5	190.3	452.5	20.0	102.7	(NA)	(NA)
1972 Census	58	72	44	11.3	99.6	8.6	16.7	70.9	217.4	158.2	377.4	20.2	98.4	95	98
INDUSTRY 3625, RELAYS AND INDUSTRIAL CONTROLS[5]															
1987 Census	(NA)	1 152	434	66.5	1 636.0	37.5	72.3	696.8	3 788.9	2 302.1	6 113.8	168.6	1 285.5	(NA)	(NA)
INDUSTRY 3629, ELECTRICAL INDUSTRIAL APPARATUS, N.E.C.															
1987 Census	(NA)	484	108	14.7	326.3	9.1	17.9	158.8	711.3	495.0	1 210.4	31.9	266.9	(NA)	(NA)
1986 ASM	(NA)	(NA)	(NA)	16.0	355.2	10.6	19.8	185.0	762.5	564.8	1 327.6	29.4	273.8	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	17.7	362.3	11.3	21.9	189.8	767.1	585.9	1 353.4	31.5	277.7	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	17.2	342.6	11.3	21.8	189.4	765.1	573.3	1 318.0	33.0	244.9	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	13.9	257.6	9.7	16.8	142.8	641.0	465.8	1 112.8	35.2	189.6	(NA)	(NA)
1982 Census	309	323	120	16.3	280.4	11.3	21.5	154.5	644.7	456.3	1 111.3	29.3	230.9	87	92
1981 ASM	(NA)	(NA)	(NA)	16.8	282.6	12.1	24.6	157.4	653.6	536.5	1 179.9	38.3	234.8	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	18.1	265.0	12.8	25.3	154.4	621.9	470.1	1 083.0	43.1	210.8	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	19.6	253.9	14.5	27.7	156.7	580.8	418.7	982.7	30.4	201.5	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	19.7	232.7	14.8	28.2	145.1	496.9	367.3	851.5	24.4	167.9	(NA)	(NA)
1977 Census	214	223	102	16.5	188.6	12.2	23.4	113.4	411.0	294.0	692.4	16.8	140.0	87	81
1976 ASM	(NA)	(NA)	(NA)	19.6	203.0	14.2	27.1	132.1	417.9	301.6	706.9	19.3	156.1	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	17.4	166.0	12.3	24.4	96.6	329.2	257.0	593.9	17.4	140.7	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	22.5	193.9	16.6	32.7	120.8	397.3	298.7	683.8	15.9	177.2	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	23.7	199.0	16.9	34.5	115.1	340.4	310.0	634.0	21.8	127.7	(NA)	(NA)
1972 Census	245	258	121	20.2	165.0	13.5	26.0	89.4	270.0	187.4	449.4	11.2	99.2	85	80

Note: Establishments of single unit companies with up to 20 employees (cutoff varied by industry) were excluded from the mail portion of the census. Data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were estimated based on administrative-record information from other agencies in conjunction with industry averages. These establishments accounted for the following percent of total value of shipments: SIC 3612, 6%; SIC 3613, 7%; SIC 3621, 6%; SIC 3624, 4%; SIC 3625, 8%; and SIC 3629, 16%.

[1] In annual survey of manufactures (ASM) years, data are estimates based on a representative sample of establishments canvassed annually and may differ from results of a complete canvass of all establishments. ASM publication shows percentage standard errors. Unless otherwise noted, for data prior to 1972, see 1972 Census of Manufactures, vol. II, table 1a of the Industry chapter.

Table 1. Historical Statistics for the Industry: 1987 and Earlier Years—Con.

[2]For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.
[3]Includes establishments with payroll at any time during year.
[4]Beginning with the 1992 Census of Manufactures, all respondents were requested to report their inventories at (the lower of) cost or market prior to adjustment to LIFO cost. This is a change from prior Censuses and annual surveys of manufactures in which respondents were permitted to value their inventories using any generally accepted accounting method. Consequently, inventories and value added by manufacture are not comparable to prior-year data.
[5]Industry definition is new for 1987 Census of Manufactures. An explanation of the Standard Industrial Classification revision will appear in the final industry series text that supercedes this report.

Table 2. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987			1982		
		Number of companies with shipments of $100,000 or more	Product shipments[1]		Number of companies with shipments of $100,000 or more	Product shipments[1]	
			Quantity[2]	Value (million dollars)		Quantity[2]	Value (million dollars)
3612- —	**TRANSFORMERS, EXCEPT ELECTRONIC**						
	Total	**(NA)**	**(X)**	**3 125.3**	**(NA)**	**(X)**	**2 772.6**
36122 --	Power and distribution transformers	(NA)	(X)	1 680.5	53	(X)	1 554.0
	Distribution transformers, liquid-immersed, all voltages, and dry-type electric utility distribution transformers (excluding general purpose):						
36122 02	Overhead type, single-phase, liquid-immersed, 500 kVA and smaller — thousands	14	(S)	435.0	(NA)	(4)	(4)
36122 04	Compartmentalized pad-mounted, single-phase, liquid-immersed, 500 kVA and smaller — do.	12	(S)	238.8	(NA)	(4)	(4)
36122 06	Subsurface and subway types, single-phase, liquid-immersed, 500 kVA and smaller — do.	6	(S)	30.9	(NA)	(4)	(4)
36122 14	Three-phase transformers 500 kVA and smaller, liquid-immersed (all voltages), including overhead type, compartmentalized pad-mounted, and subsurface and subway types — do.	14	(S)	211.8	(NA)	(4)	(4)
36122 16	Network transformers, all ratings, excluding network protectors — do.	7	(S)	58.5	(NA)	(4)	(4)
36122 19	Single-phase and three-phase, pad-mounted (dry), 500 kVA and smaller — do.	3	(S)	1.1	(NA)	(4)	(4)
	Small power transformers, single- and three-phase, all voltages:						
36122 21	Compartmentalized pad-mounted and subsurface underground and conventional subway type transformers, self-cooled equivalent ratings of 501 kVA through 2,500 kVA, liquid-immersed — number	13	(S)	102.4	(NA)	(4)	(4)
36122 23	Conventional transformers and autotransformers, with and without load-tap-changing, primary unit substation transformers and single circuit unit substations 501 through 2,500 kVA, liquid-immersed — do.	12	[3]2 152	[3]44.8	(NA)	(4)	(4)
36122 28	Liquid-immersed conventional transformers and autotransformers, with and without load-tap-changing, primary unit substation transformers and single circuit unit substations 2,501 through 10,000 kVA, liquid and nonliquid — do.	14	(S)	65.1	(NA)	(4)	(4)
36122 29	Dry-type small power transformers, self-cooled equipment ratings of 501 kVA or more, single- and three-phase high voltage 601 volts and larger; conventional transformers, primary unit substation transformers and core and coil units — do.	2	(3)	(3)	(NA)	(4)	(4)
36122 32	Secondary unit substation transformers, liquid-immersed, all kVA ratings (based on self-cooled nameplate rating); single- and three-phase, all high voltages, and low voltages below 1,000 volts; mineral oil and nonlow flammability fluids — do.	9	3 329	63.2	(NA)	(4)	(4)
36122 33	Secondary unit substation transformers, dry-type, single- and three-phase all kVA ratings, all high voltages, and low voltages below 1,000 volts; units sold with or without secondary switching equipment, but with a flange or throat for connection to such equipment (for dry-type, also includes core and coil units for ultimate use in secondary unit substations) — do.	8	(S)	35.4	(NA)	(4)	(4)
	Large power transformers, liquid-immersed, self-cooled equivalent ratings (based on self-cooled nameplate ratings), 10,001 kVA or more, single- and three-phase, all high and low voltages; conventional transformers and autotransformers, with and without load-tap- changing primary unit substation transformers and regulating transformers:						
	10,001 kVA, OA to 30,000 kVA, OA (50,000 kVA, top FOA):						
36122 37	With load-tap-changing — number	10	418	105.8	(NA)	(4)	(4)
36122 39	Without load-tap-changing — do.	9	288	56.2	(NA)	(4)	(4)
	30,001 kVA, OA (50,001 kVA, top FOA) to 100,000 kVA, OA (167,000 kVA, top FOA):						
36122 41	With load-tap-changing — number	7	95	39.7	(NA)	(4)	(4)
36122 42	Without load-tap-changing — do.	7	85	38.5	(NA)	(4)	(4)
	100,001 kVA, OA (167,001 kVA, top FOA) and larger:						
36122 43	With load-tap-changing — number	4	(S)	23.1	(NA)	(4)	(4)
36122 44	Without load-tap-changing — do.	4	(S)	50.7	(NA)	(4)	(4)
36122 00	Power and distribution transformers (except parts), n.s.k.	(NA)	(X)	79.5	(NA)	(4)	(4)

See footnotes at end of table.

Table 2. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text.]

1987 product code	Product	1987			1982		
		Number of companies with shipments of $100,000 or more	Product shipments[1]		Number of companies with shipments of $100,000 or more	Product shipments[1]	
			Quantity[2]	Value (million dollars)		Quantity[2]	Value (million dollars)
3612- --	**TRANSFORMERS, EXCEPT ELECTRONIC**—Con.						
36123 --	Specialty transformers except fluorescent lamp ballast	(NA)	(X)	273.7	(NA)	(X)	[5]545.1
36123 01	Open core and coil units, excluding machine tool control transformers and all units end-bell enclosed (250 VA or less) thousands	8	(S)	25.6			
36123 02	Machine tool control transformers do	6	(S)	13.5			
	High intensity discharge lamp transformers, also known as ballasts:						
36123 03	Mercury vapor lamp thousands	4	(D)	[6]			
36123 04	Metal halide lamp do	4	(D)	[6]			
36123 05	High pressure sodium vapor lamp do	5	(D)	[6]	(NA)	[4]	[4]
	Instrument transformers:						
36123 06	Indoor and outdoor current transformers thousands	7	(S)	34.6			
36123 07	Indoor and outdoor voltage transformers do	5	(S)	17.4			
36123 11	All other specialty transformers, including luminous tube transformers and ignition transformers but excluding internal combustion engine ignition do	11	(S)	[5]171.7			
36123 00	Specialty transformers except fluorescent lamp ballast, n.s.k.	(NA)	(X)	10.9			
36124 --	Fluorescent lamp ballasts:						
36124 00	Fluorescent lamp ballasts (for additional detail, see Current Industrial Report MQ-36C, Fluorescent Lamp Ballasts)	9	(X)	526.3	12	(X)	312.1
36126 --	Commercial, institutional, and industrial general-purpose transformers, all voltages, single- and three-phase, excluding electric utility distribution transformers	(NA)	(X)	232.6	(NA)	(X)	[5]
36126 01	Single- and three-phase all enclosed general-purpose and buck-boost transformers and open core and coil units, 3 kVA and below, all voltages number	8	775 497	31.8			
36126 02	Single- and three-phase, 3.01 kVA through 15 kVA, all voltages do	12	(S)	29.8			
36126 03	Single- and three-phase, 15.01 kVA through 100 kVA, all voltages do	12	(S)	77.5			
36126 04	Single- and three-phase, 100.01 kVA and above, all voltages do	13	(S)	55.4	(NA)	[4]	[4]
36126 05	Voltage regulating transformers, except transmission and distribution voltage regulators do	6	(S)	27.9			
36126 09	Other general-purpose transformers, including saturable core reactors do	8	(S)	9.3			
36126 00	Commercial, institutional, and industrial general-purpose transformers, all voltages, single- and three-phase, excluding electric utility distribution transformers, n.s.k.	(NA)	(X)	9			
36127 --	Power regulators, boosters, and other transformers, including parts and accessories for all transformers	(NA)	(X)	168.4	37	(X)	243.2
36127 11	Transmission and distribution voltage regulators, single- and three-phase, including induction voltage regulators, and step voltage regulators number	4	(D)	[7]			
36127 31	Reactor and special-purpose transformers, liquid-immersed and dry-type, all voltages and kVA's such as: reactors, furnace transformers, rectifier transformers, locomotive transformers, grounding transformers, ground fault neutralizers, mobile transformers, mobile unit substations, and integral single-circuit unit substations do	14	(S)	[5]55.3	(NA)	(NA)	[4]
36127 78	Parts, including renewal and repair parts, subassemblies and accessories for all transformers	14	(X)	110.3			
36127 00	Power regulators, boosters, and other transformers, including parts and accessories for all transformers, n.s.k.	(NA)	(X)	2.8			
36120 --	Transformers, except electronic, n.s.k.	(NA)	(X)	243.8	(NA)	(X)	118.2
36120 00	Transformers, except electronic, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	(X)	164.1	(NA)	(X)	85.4
36120 02	Transformers, except electronic, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	(X)	79.7	(NA)	(X)	32.8
3613- --	**SWITCHGEAR AND SWITCHBOARD APPARATUS**						
	Total	**(NA)**	**(X)**	**4 681.8**	**(NA)**	**(X)**	**[8]4 263.6**
36132 --	Power circuit breakers, all voltages:						
36132 00	Power circuit breakers, all voltages (for additional detail, see Current Industrial Report MA-36A, Switchgear, Switchboard Apparatus, Relays, and Industrial Controls)	28	(X)	388.6	39	(X)	394.6
36133 --	Low voltage panelboards and distribution boards and other switching and interrupting devices, 1,000 volts or less:						
36133 00	Low voltage panelboards and distribution boards and other switching and interrupting devices, 1000 volts or less (for additional detail, see Current Industrial Report MA-36A, Switchgear, Switchboard Apparatus, Relays, and Industrial Controls)	120	(X)	1 537.0	170	(X)	1 299.5
36134 --	Fuses and fuse equipment, less than 2300 volts, except power distribution cut-outs:						
36134 00	Fuses and fuse equipment, less than 2300 volts, except power distribution cut-outs (for additional detail, see Current Industrial Report MA-36A, Switchgear, Switchboard Apparatus, Relays, and Industrial Controls)	22	(X)	359.2	31	(X)	280.6

See footnotes at end of table.

Table 2. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text.]

1987 product code	Product	1987			1982		
		Number of companies with shipments of $100,000 or more	Product shipments[1]		Number of companies with shipments of $100,000 or more	Product shipments[1]	
			Quantity[2]	Value (million dollars)		Quantity[2]	Value (million dollars)
3613- —	**SWITCHGEAR AND SWITCHBOARD APPARATUS**—Con.						
36135 —	Molded case circuit breakers, 1000 volts or less:						
36135 00	Molded case circuit breakers, 1000 volts or less (for additional detail, see Current Industrial Report MA-36A, Switchgear, Switchboard Apparatus, Relays, and Industrial Controls)	25	(X)	973.6	28	(X)	711.1
36136 —	Duct, including plug-in units and accessories, 1000 volts or less:						
36136 00	Duct, including plug-in units and accessories, 1000 volts or less (for additional detail, see Current Industrial Report MA-36A, Switchgear, Switchboard Apparatus, Relays, and Industrial Controls)	17	(X)	131.6	27	(X)	162.5
36139 —	Switchgear, except ducts and relays:						
36139 00	Switchgear, except ducts and relays (for additional detail, see Current Industrial Report MA-36A, Switchgear, Switchboard Apparatus, Relays, and Industrial Controls)	108	(X)	1 033.0	141	(X)	1 230.5
36130 —	Switchgear and switchboard apparatus, n.s.k.	(NA)	(X)	258.8	(NA)	(X)	184.8
36130 00	Switchgear and switchboard apparatus, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	(X)	145.8	(NA)	(X)	129.2
36130 02	Switchgear and switchboard apparatus, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	(X)	113.0	(NA)	(X)	55.6
3621- —	**MOTORS AND GENERATORS**						
	Total	**(NA)**	**(X)**	**6 981.4**	**(NA)**	**(X)**	**6 724.6**
36211 —	Fractional horsepower motors:						
36211 00	Fractional horsepower motors (rated at less than 746 watts) (excluding hermetics) (for additional detail, see Current Industrial Report MA-36H, Motors and Generators)	113	(X)	3 478.9	133	(X)	2 518.7
36212 —	Integral horsepower motors and generators, except for land transportation equipment, excluding hermetics:						
36212 00	Integral horsepower motors and generators other than for land transportation equipment (rated at 746 watts or more) (excluding hermetics) (for additional detail, see Current Industrial Report MA-36H, Motors and Generators)	52	(X)	1 293.5	66	(X)	1 454.2
36213 —	Land transportation motors, generators, and control equipment excluding parts:						
36213 00	Land transportation motors, generators, and control equipment excluding parts (for additional detail, see Current Industrial Report MA-36H, Motors and Generators)	14	(X)	233.1	24	(X)	460.2
36214 —	Prime mover generator sets, except steam or hydraulic turbine:						
36214 00	Prime mover generator sets, except steam or hydraulic turbine (for additional detail, see Current Industrial Report MA-36H, Motors and Generators)	42	(X)	787.7	37	(X)	961.5
36217 —	Fractional motor generator sets and other rotating equipment, including hermetics:						
36217 00	Fractional motor generator sets and other rotating equipment, including hermetics (for additional detail, see Current Industrial Report MA-36H, Motors and Generators)	34	(X)	237.9	33	(X)	264.5
36218 —	Integral motor generator sets and other rotating equipment, including hermetics:						
36218 00	Integral motor generator sets and other rotating equipment, including hermetics (for additional detail, see Current Industrial Report MA-36H, Motors and Generators)	23	(X)	296.8	29	(X)	379.3
36219 —	Parts and supplies for motors, generators, generator sets, and other rotating equipment:						
36219 00	Parts and supplies for motors, generators, generator sets, and other rotating equipment, excluding motors for built-in jobs (for additional detail, see Current Industrial Report MA-36H, Motors and Generators)	107	(X)	542.1	78	(X)	510.6
36210 —	Motors and generators, n.s.k.	(NA)	(X)	111.4	(NA)	(X)	175.6
36210 00	Motors and generators, n.s.k., typically for establishments with 20 employees or more (see note)	(NA)	(X)	23.3	(NA)	(X)	138.4
36210 02	Motors and generators, n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	(X)	88.1	(NA)	(X)	37.2
3624- —	**CARBON AND GRAPHITE PRODUCTS**						
	Total	**(NA)**	**(X)**	**1 224.3**	**(NA)**	**(X)**	**900.9**
36241 —	Electrodes	(NA)	(X)	560.4	(NA)	(X)	440.5
	Electrodes for electric furnaces and electrolytic cell use, including paste for self-bake electrodes:						
36241 52	Carbon ..... mil lb	5	330.6	122.2	5	172.0	92.8
36241 56	Graphite ..... do	12	(S)	437.3	5	263.9	347.7
36241 00	Electrodes, n.s.k.	(NA)	(X)	.9	(NA)	(X)	-

See footnotes at end of table.

Table 2. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text.]

1987 product code	Product	1987			1982		
		Number of companies with shipments of $100,000 or more	Product shipments[1]		Number of companies with shipments of $100,000 or more	Product shipments[1]	
			Quantity[2]	Value (million dollars)		Quantity[2]	Value (million dollars)
3624- --	**CARBON AND GRAPHITE PRODUCTS**—Con.						
36249 --	All other carbon and graphite products	(NA)	(X)	607.5	(NA)	(X)	433.6
	Brushes, contacts, and brush plates:						
36249 11	Automotive brushes (starter, generator, and alternator), including replacement brushes (automotive and light truck type, 6 to 12 volts, inclusive) and those that are coded (excluding automotive accessory brushes)	5	(X)	43.0	5	(X)	23.6
36249 13	Other fractional horsepower brushes and contacts, including replacement brushes (brushes 1/4 sq in. or less in cross section or 1 1/2 in. long or less, including miniature brushes) and automobile accessory brushes	12	(X)	22.4	9	(X)	13.8
36249 15	Other industrial brushes and contacts (brushes more than 1/4 sq in. in cross section and more than 1 1/2 in. long)	11	(X)	56.7	14	(X)	62.0
36249 17	Brush plates	7	(X)	7.6	5	(X)	4.5
36249 88	Carbon and graphite fibers	9	(X)	155.8	(D)	(X)	(D)
	All other carbon and graphite products, except refractories:						
36249 81	For electrical uses, including welding products, rods, plates, paste brazing, and soldering tips; illuminating carbons; pile and rheostat resistance discs, plugs, plates, and rods; power tube and rectifier parts and plates or rods; spectroscopic products; battery; electronic graphite; telephone components, resistance elements, etc. (excluding silver or other metal contacts)	11	(X)	93.7	15	(X)	117.2
36249 83	For mechanical uses, including one-piece seals, bushings and bearings, packing rings for steam seal, rotor vanes, and other uses where there is relative motion between two parts (excluding metallic oilless bearings)	20	(X)	80.6	20	(X)	87.2
36249 86	For aerospace uses, including unmachined stock and machined items not included elsewhere	8	(X)	19.9	6	(X)	15.3
	For all other uses (including chemical, metallurgical, etc.):						
36249 94	Paste	5	(X)	33.5	[9]22	(X)	[9]104.3
36249 96	Other	14	(X)	91.1			
36249 00	All other carbon and graphite products, n.s.k.	(NA)	(X)	3.2	(NA)	(X)	5.8
36240 --	Carbon and graphite products, n.s.k.	(NA)	(X)	56.4	(NA)	(X)	26.8
36240 00	Carbon and graphite products, n.s.k., typically for establishments with 20 employees or more (see note)	(NA)	(X)	32.4	(NA)	(X)	17.2
36240 02	Carbon and graphite products, n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	(X)	24.0	(NA)	(X)	9.6
3625- --	**RELAYS AND INDUSTRIAL CONTROLS**						
	Total	**(NA)**	**(X)**	**[10]6 034.6**	**(NA)**	**(X)**	**[10]5 178.4**
36251 --	Relays for electronic circuitry, industrial control, overload, and switchgear type:						
36251 00	Relays for elctronic circuitry, industrial control, overload, and switchgear type	122	(X)	908.6	(NA)	(X)	[11,12]1 146.8
36252 --	Specific-purpose industrial controls:						
36252 00	Specific-purpose industrial controls (for additional detail, see Current Industrial Report MA-36A, Switchgear, Switchboard Apparatus, Relays, and Industrial Controls)	248	(X)	1 812.9	270	(X)	[13]1 406.7
36253 --	General-purpose industrial controls:						
36253 00	General-purpose industrial controls (for additional detail, see Current Industrial Report MA-36A, Switchgear, Switchboard Apparatus, Relays, and Industrial Controls)	216	(X)	2 314.5	238	(X)	[14]2 171.8
36254 --	Parts for industrial controls and motor-control accessories:						
36254 00	Parts for industrial controls and motor-control accessories (for additional detail, see Current Industrial Report MA-36A, Switchgear, Switchboard Apparatus, Relays, and Industrial Controls)	125	(X)	440.1	(NA)	(X)	[15,16]
36250 --	Relays and industrial controls, n.s.k.	(NA)	(X)	558.5	(NA)	(X)	[16]
36250 00	Relays and industrial controls, n.s.k., typically for establishments with 20 employees or more (see note)	(NA)	(X)	278.1	(NA)	(X)	[16]
36250 02	Relays and industrial controls, n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	(X)	280.4	(NA)	(X)	[16]
3629- --	**ELECTRICAL INDUSTRIAL APPARATUS, N.E.C.**						
	Total	**(NA)**	**(X)**	**1 175.1**	**(NA)**	**(X)**	**1 003.1**
36291 --	Capacitors for industrial use (except for electronic circuitry)	(NA)	(X)	136.9	(NA)	(X)	190.0
36291 01	Shunt and series power capacitors, units, and equipment, 1/2 kVA or more, and accessories for power factor correction and other low frequency ac applications ..... thousands	4	(S)	97.5	5	(S)	107.2
	Ac capacitors (except electrolytic):						
36291 03	General purpose, for motors, controls, etc. ..... millions	4	(S)	35.6	5	(S)	44.5
36291 05	High intensity discharge lighting ..... do	1			(NA)	(D)	[16]
36291 09	Other capacitors, except for electronic circuitry	3			(NA)	(S)	[16]35.9
36291 00	Capacitors for industrial use, n.s.k.	(NA)	(X)	3.8	(NA)	(X)	2.4

See footnotes at end of table.

Table 2. Product and Product Classes--Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987			1982		
		Number of companies with shipments of $100,000 or more	Product shipments[1]		Number of companies with shipments of $100,000 or more	Product shipments[1]	
			Quantity[2]	Value (million dollars)		Quantity[2]	Value (million dollars)
3629- —	**ELECTRICAL INDUSTRIAL APPARATUS, N.E.C.**—Con.						
36292 —	Rectifying apparatus	(NA)	(X)	587.4	(NA)	(X)	524.8
	Rectifying (power conversion) apparatus (except for electronic circuitry), including all apparatus using semiconductors and/or electron tubes as power conversion means:						
	Semiconductor power conversion apparatus:						
	Semiconductor battery chargers:						
36292 21	Automotive ---- thousands	3	1 609.8	46.2	8	(S)	40.0
36292 25	Industrial and railroad ---- do	9	(S)	51.0	9	(S)	30.6
36292 31	Semiconductor computer supplies	4	(X)	(17)	4	(X)	(17)
	Semiconductor high-voltage power supplies in excess of 2 kV (excluding separate associated apparatus such as controls, capacitors, switchgear, etc.):						
36292 41	100 kW or less	15	(X)	122.6	15	(X)	98.0
36292 45	More than 100 kW	8	(X)	61.0	7	(X)	52.4
36292 49	All other ac to dc semiconductor power conversion apparatus	10	(X)	[17]117.2	18	(X)	[17]94.6
36292 99	Other rectifying (power conversion) apparatus	16	(X)	146.1	25	(X)	199.8
36292 00	Rectifying apparatus, n.s.k.	(NA)	(X)	43.4	(NA)	(X)	9.4
36293 —	Electrical equipment for industrial use, n.e.c.	(NA)	(X)	249.8	(NA)	(X)	213.0
36293 01	Coil windings, electrical ---- millions	10	(S)	42.9	12	(S)	27.0
36293 02	Solenoids (except solenoid-actuated regulating valves) ---- thousands	9	(S)	29.7	8	(S)	28.0
36293 03	Surge suppressors	3	(X)	4.6			
36293 04	Cathodic protection equipment	4	(X)	19.7			
36293 05	Electrical discharge equipment	1	(X)	(18)	41	(X)	153.4
36293 09	Other miscellaneous electrical equipment for industrial use, n.e.c.	22	(X)	[18]132.2			
36293 00	Electrical equipment for industrial use, n.e.c., n.s.k.	(NA)	(X)	20.7	(NA)	(X)	4.6
36290 —	Electrical industrial apparatus, n.e.c., n.s.k.	(NA)	(X)	201.0	(NA)	(X)	75.3
36290 00	Electrical industrial apparatus, n.e.c., n.s.k. typically for establishments with 20 employees or more (see note)	(NA)	(X)	105.7	(NA)	(X)	33.8
36290 02	Electrical industrial apparatus, n.e.c., n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	(X)	95.3	(NA)	(X)	41.5

Note: In 1987 Census of Manufactures, data for establishments of small single unit companies with up to 20 employees were estimated from administrative-record data rather than data actually collected from respondents. Employment cutoffs used for administrative records for each industry and shipments figures are included in code ending with "002". In both 1987 and 1982 Censuses of Manufactures, products not completely identified on standard forms were coded in appropriate product class (five-digit) followed by "00" or to appropriate product group code (four-digit) followed by "000".

[1]Data reported by all producers, not just those with shipments of $100,000 or more.

[2]For some establishments, data have been estimated from central unit values which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: * 10 to 19 percent estimated; ** 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

[3]For 1987, data for product code 36122 29 have been combined with product code 36122 23 to avoid disclosing data for individual companies.

[4]For 1982, detail product data were collected in Current Industrial Report MA-36G, Transformers. In 1987, these data were collected in the Census of Manufactures.

[5]For 1982, data for product codes 36213 -- and 36126 -- were collected and published as product code 36125 00, Specialty Transformers (Except Fluorescent Lamp Ballasts).

[6]For 1987, data for product codes 36123 03, 36123 04, and 36123 05 were combined with product code 36123 11 to avoid disclosing data for individual companies.

[7]For 1987, data for product code 36127 11 have been combined with product code 36127 31 to avoid disclosing data for individual companies.

[8]For 1982, old SIC Industry 3613 included product class 36138, Relays, with a value of shipments of $497.1 million. In 1987, that product class is included in new SIC Industry 3625, Relays and Industrial Controls.

[9]For 1982, product code 36249 88 was combined with product codes 36249 94 and 36249 96 to avoid disclosing data for individual companies.

[10]SIC Industry 3625, Relays and Industrial Controls, is published as a separate industry for the first time in 1987. In 1982, it was part of old SIC Industries 3613, Switchgear and Switchboard Apparatus; 3622, Industrial Controls; and 3679, Electronic Components, N.E.C., and separate data are not available.

[11]For 1982, data for product code 36251 00 were collected and published under product codes 36138 00 (pt), Relays, and 36794 00, Relays for Electronic Circuitry.

[12]For 1982, data for product code 36254 00 were included with product code 36251 00 because data for motor-control accessories were not available separately.

[13]For 1982, data for product code 36252 00 were collected and published as 36221 00, Specific Purpose Industrial Controls.

[14]For 1982, data for product code 36253 00 were collected and published as 36222 00, General Purpose Industrial Controls.

[15]For 1982, data for product code 36254 00 were collected and published as 36138 00 (pt) Relays, and 36223 00, Parts for Industrial Controls.

[16]For 1982, data for product code 36291 05 were combined with product code 36291 09 to avoid disclosing data for individual companies.

[17]For both 1987 and 1982, data for product code 36292 31 were combined with product code 36292 49 to avoid disclosing data for individual companies.

[18]For 1987, data for product code 36293 05 were combined with product code 36293 09 to avoid disclosing data for individual companies.

Table 3. Materials Consumed by Kind: 1987 and 1982

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity[1]	Delivered cost (million dollars)	Quantity[1]	Delivered cost (million dollars)
	INDUSTRY 3612, TRANSFORMERS, EXCEPT ELECTRONIC				
	Materials, parts, containers, and supplies	**(X)**	**1 545.5**	**(X)**	**1 330.8**
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes, 1,000 s tons	(S)	7.5	*17.4	9.7
331012	Sheet and strip, do	202.0	104.3	*193.7	110.4
331013	Plates, do	46.8	23.5	*40.2	19.7
331015	Structural shapes, do	(S)	14.4	(S)	54.8
331055	All other carbon steel mill shapes and forms, do	(S)	36.3	59.4	53.8
331020	Alloy steel, except stainless, do	*169.0	244.9	116.5	167.3
331031	Stainless steel mill shapes and forms, do	*4.1	8.5	*3.3	5.2
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil, mil lb	(S)	30.7	**157.4	24.2
335008	All other (wire, rolled rod and bar, powder, welded tubing, etc.), do	*29.2	27.4	(S)	31.3
335770	Magnet wire, do	91.1	121.6	*72.2	95.1
	Copper and copper-base alloy:				
335728	Bare wire (for electrical conduction only), mil lb	(S)	33.5	72.6	38.7
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes, do	**25.8	25.7	*30.2	19.7
335143	Plate, sheet, and strip, including military cups and discs, do	(S)	14.0	12.8	10.6
335152	Pipe and tube, do	(S)	1.6	(S)	1.4
	Insulated wire and cable, except magnet wire:				
335792	Copper (quantity of copper content), mil lb	**13.8	22.7	(S)	17.6
335793	Aluminum (quantity of aluminum content), do	(D)	[3]	(S)	1.9
333401	Aluminum and aluminum-base alloy refinery shapes, 1,000 s tons	(S)	2.8	* 4	1.2
290001	Refined petroleum products (gasoline, jet fuel, lubricating oils and greases, asphalt, etc.)	(X)	63.0	(X)	64.5
326400	Porcelain, steatite, and other ceramic electrical products	(X)	32.5	(X)	29.1
260003	Paper and paperboard products, except paperboard boxes and containers	(X)	48.0	(X)	33.2
285101	Paints, varnishes, lacquers, shellacs, japans, enamels, and allied products, 1,000 gal	(S)	20.8	**1 989.5	12.8
329300	Gaskets (all type) and asbestos packing	(X)	3.6	(X)	4.1
329601	Mineral wool insulation (fibrous glass, rock wool, etc.)	(X)	5.8	(X)	[3]
345001	Bolts, nuts, screws, rivets, and screw machine products	(X)	16.1	(X)	10.0
362001	Electrical industrial capacitors, resistors, rheostats, and coil windings	(X)	57.7	(X)	79.3
364300	Current-carrying wiring devices	(X)	33.5	(X)	21.0
970099	All other materials and components, parts, containers, and supplies	(X)	[3]394.1	(X)	[3]330.8
971000	Materials, parts, containers, and supplies, n.s.k.[2]	(X)	151.0	(X)	83.4
	INDUSTRY 3613, SWITCHGEAR AND SWITCHBOARD APPARATUS				
	Materials, parts, containers, and supplies	**(X)**	**[4]1 686.9**	**(NA)**	**([4])**
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes, 1,000 s tons	(S)	16.4	(NA)	(NA)
331012	Sheet and strip, do	(S)	103.2	(NA)	(NA)
331013	Plates, do	(S)	13.5	(NA)	(NA)
331015	Structural shapes, do	(S)	20.2	(NA)	(NA)
331055	All other carbon steel mill shapes and forms, do	(S)	3.9	(NA)	(NA)
331020	Alloy steel, except stainless, do	(D)	[3]	(NA)	(NA)
	Stainless steel:				
331033	Sheet and strip, 1,000 s tons	1.5	2.5	(NA)	(NA)
331050	All other stainless steel mill shapes and forms, do	(S)	3.5	(NA)	(NA)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil, mil lb	**4.1	5.1	(NA)	(NA)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc., do	**20.1	26.7	(NA)	(NA)
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.), do	**3.6	4.7	(NA)	(NA)
	Copper and copper-base alloy:				
335728	Bare wire (for electrical conduction only), mil lb	(S)	7.4	(NA)	(NA)
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes, do	**46.0	56.1	(NA)	(NA)
335143	Plate, sheet, and strip, including military cups and discs, do	17.1	24.8	(NA)	(NA)
335152	Pipe and tube, do	.6	1.0	(NA)	(NA)
335770	Magnet wire, do	**1.2	2.4	(NA)	(NA)
	Insulated wire and cable, except magnet wire:				
335792	Copper (quantity of copper content), mil lb	(S)	7.6	(NA)	(NA)
335793	Aluminum (quantity of aluminum content), do	(S)	.4	(NA)	(NA)
	Castings (rough and semifinished):				
332011	Iron (gray and malleable), 1,000 s tons	(S)	1.5	(NA)	(NA)
332045	Steel, do	(S)	1.7	(NA)	(NA)
336005	Aluminum and aluminum-base alloy, mil lb	(S)	8.8	(NA)	(NA)
336006	Copper and copper-base alloy, do	(S)	6.7	(NA)	(NA)
336008	Other nonferrous, except copper and aluminum, do	(D)	[3]	(NA)	(NA)
	Industrial electrical control equipment (received for incorporation only into other industrial electrical control equipment shipped as such, by same plant):				
362500	Purchased from other companies	(X)	85.6	(NA)	(NA)
362501	Received from other plants of same company	(X)	141.6	(NA)	(NA)
326400	Porcelain, steatite, and other ceramic electrical products	(X)	32.1	(NA)	(NA)
308007	Plastics products consumed in the form of sheets, rods, tubes, and other shapes	(X)	58.6	(NA)	(NA)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., but excluding sheets, rods, tubes, and shapes, mil lb	(S)	32.7	(NA)	(NA)
333001	Nonferrous metal smelter and refinery shapes, including precious metal, do	(S)	30.6	(NA)	(NA)

See footnotes at end of table.

Table 3. **Materials Consumed by Kind: 1987 and 1982**—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material		1987 Quantity[1]	1987 Delivered cost (million dollars)	1982 Quantity[1]	1982 Delivered cost (million dollars)
	INDUSTRY 3613, SWITCHGEAR AND SWITCHBOARD APPARATUS—Con.					
345001	Bolts, nuts, screws, rivets, and screw machine products		(X)	49.7	(NA)	(NA)
361301	Switches, except snap, toggle and push, and circuit breakers		(X)	18.3	(NA)	(NA)
362101	Electric motors, generators and parts		(X)	10.1	(NA)	(NA)
344401	Sheet metal products, except stampings		(X)	21.8	(NA)	(NA)
367002	Resistors, capacitors, transformers, transducers, and other electronic-type components and accessories, except semiconductors		(X)	55.7	(NA)	(NA)
970099	All other materials, components, parts, containers, and supplies		(X)	[2]425.0	(NA)	(NA)
971000	Materials, parts, containers, and supplies, n.s.k.[3]		(X)	407.0	(NA)	(NA)
	INDUSTRY 3621, MOTORS AND GENERATORS					
	Materials, parts, containers, and supplies		**(X)**	**2 883.8**	**(X)**	**2 322.6**
	Mill shapes and forms, except castings and forgings:					
	Carbon steel:					
331011	Bars and bar shapes	1,000 s tons	(S)	57.3	**84.0	53.4
331012	Sheet and strip	do	**528.3	250.3	575.3	310.1
331013	Plates	do	(S)	7.8	*50.3	25.0
331017	Wire and wire products	do	(S)	17.0	(S)	6.6
331058	All other carbon steel mill shapes and forms	do	154.7	53.1	(S)	25.2
331020	Alloy steel, except stainless	do	(S)	10.8	**28.3	21.1
331031	Stainless steel	do	(S)	6.8	**8.1	6.8
	Copper and copper-base alloy:					
335728	Bare wire for electrical conduction only	mil lb	(S)	24.6	(S)	17.3
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes	do	(S)	29.6	**6.9	11.4
335003	Other	do	(S)	12.7	4.6	8.1
	Aluminum and aluminum-base alloy:					
335301	Sheet, plate, and foil	mil lb	(S)	16.1	*12.7	8.3
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc.	do	**6.0	5.3	*6.7	6.1
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing)	do	(S)	22.7	(S)	10.0
	Primary metals:					
333122	Copper and copper-base alloy refinery shapes	1,000 s tons	(S)	5.5	1.6	3.1
333401	Aluminum and aluminum-base alloy refinery shapes	do	34.2	40.4	29.2	34.8
335770	Magnet wire	mil lb	**134.9	191.2	*137.9	213.3
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content)	do	(S)	16.8	(S)	40.9
	Castings (rough and semifinished):					
332011	Iron (gray and malleable)	1,000 s tons	(S)	69.8	**73.9	76.2
332045	Steel	do	(S)	6.6	(S)	3.7
336005	Aluminum and aluminum-base alloy	mil lb	(S)	77.1	(S)	49.9
336006	Copper and copper-base alloy	do	(S)	2.8	(S)	5.0
336008	Other nonferrous	do	(S)	19.2	(S)	9.0
346200	Iron and steel forgings	1,000 s tons	(D)	[4]	2.3	4.2
	Engines:					
351920	Diesel and semidiesel	thousands	(S)	82.9	(S)	99.7
351901	Gasoline and other carburetor	do	(S)	38.4	*28.0	17.0
362120	Integral horsepower electric motors and generators (1 hp or more)	do	(S)	12.1	(S)	40.0
	Bearings, including mounted and unmounted:					
356219	Ball		(X)	35.3	(X)	47.4
356201	Roller		(X)	2.6	(X)	2.9
356810	Plain bearings and bushings		(X)	20.3	(X)	11.2
356601	Speed changers, drives, and gears		(X)	28.6	(X)	6.3
346901	Metal stampings	1,000 s tons	(S)	137.5	(S)	74.2
345001	Bolts, nuts, screws, rivets, and screw machine products		(X)	53.9	(X)	37.9
367408	Semiconductors	millions	(S)	16.0	(S)	5.8
362491	Carbon brushes		(X)	16.3	(X)	8.5
326401	Ceramic magnets (ferrite)		(X)	34.7	(X)	15.9
329601	Mineral wool insulation (fibrous glass, rock wool, mica, etc.)		(X)	9.5	(X)	6.5
308007	Plastics products consumed in the form of sheets, rod, tubes, and other shapes		(X)	77.6	(X)	45.7
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., but excluding sheets, rods, tubes, and other shapes	mil lb	*21.2	29.6	*11.3	15.7
285101	Paints, varnishes, lacquers, shellacs, japans, enamels, and allied products	1,000 gal	(S)	23.5	(S)	16.1
362001	Electrical capacitors, resistors, rheostats, and coil windings		(X)	53.8	(X)	67.1
360101	Electrical transmission, distribution, and control equipment		(X)	42.8	(X)	33.6
306902	Fabricated rubber products, except tires, tubes, hose, belting, and gaskets		(X)	7.9	(X)	11.3
265001	Paperboard boxes and containers		(X)	47.8	(X)	28.6
970099	All other materials and components, parts, containers, and supplies		(X)	[3]609.2	(X)	449.8
971000	Materials, parts, containers, and supplies, n.s.k.[3]		(X)	560.0	(X)	331.9
	INDUSTRY 3624, CARBON AND GRAPHITE PRODUCTS					
	Materials, parts, containers, and supplies		**(X)**	**449.2**	**(X)**	**314.4**
335105	Copper and copper-base alloy, mill shapes and forms (except castings and forgings)	mil lb	(S)	4.3	(D)	(D)
260001	Paper and paperboard products		(X)	2.1	(X)	1.0
286556	Pitch		(X)	20.2	(X)	(D)
299901	Coke: petroleum coke, metallurgical coke, calcined coke, foundry coke, etc., used as raw material	1,000 s tons	(S)	56.5	210.3	90.1
329508	Natural graphite	do	8.9	8.1	2.1	2.8

See footnotes at end of table.

Table 3. **Materials Consumed by Kind: 1987 and 1982**—Con.

(Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text.)

1987 material code	Material	1987 Quantity[1]	1987 Delivered cost (million dollars)	1982 Quantity[1]	1982 Delivered cost (million dollars)
	INDUSTRY 3624, CARBON AND GRAPHITE PRODUCTS—Con.				
329900	Artificial graphite	(X)	[3]	(X)	8.1
329500	Carbon, ground or treated	(X)	17.9	(X)	23.2
339915	Metal powders, mil lb	(S)	4.4	*3.8	4.0
970099	All other materials and components, parts, containers, and supplies	(X)	[3]250.8	(X)	167.9
971000	Materials, parts, containers, and supplies, n.s.k.[2]	(X)	84.9	(X)	17.3
	INDUSTRY 3625, RELAYS AND INDUSTRIAL CONTROLS				
	Materials, parts, containers, and supplies	**(X)**	**[4]2 044.9**	**(NA)**	**[4]**
	Mill shapes and forms, except castings and forgings:				
331001	Carbon steel, 1,000 s tons	(S)	62.2	(NA)	(NA)
331020	Alloy steel, except stainless, do	(S)	3.5	(NA)	(NA)
331031	Stainless steel, do	(S)	10.6	(NA)	(NA)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil, mil lb	(S)	4.6	(NA)	(NA)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc., do	(S)	6.6	(NA)	(NA)
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.), do	(S)	1.1	(NA)	(NA)
	Copper and copper-base alloy:				
335728	Bare wire for electrical conduction only, mil lb	(S)	5.8	(NA)	(NA)
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes, do	**12.3	10.4	(NA)	(NA)
335143	Plate, sheet, and strip, including military cups and discs, do	**7.5	10.8	(NA)	(NA)
335152	Pipe and tube, do	(S)	5	(NA)	(NA)
335791	Insulated wire and cable, except magnet wire, do	(S)	17.4	(NA)	(NA)
335770	Magnet wire, do	(S)	11.0	(NA)	(NA)
	Castings (rough and semifinished):				
332012	Iron (gray and malleable) and steel, 1,000 s tons	(S)	8.4	(NA)	(NA)
336005	Aluminum and aluminum-base alloy, mil lb	(S)	9.1	(NA)	(NA)
336003	Other nonferrous, do	(S)	5.9	(NA)	(NA)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., but excluding sheets, rods, tubes, and shapes, do	**12.6	17.9	(NA)	(NA)
345001	Bolts, nuts, screws, rivets, and screw machine products	(X)	40.0	(NA)	(NA)
344401	Sheet metal products, except stampings	(X)	35.3	(NA)	(NA)
970099	All other materials and components, parts, containers, and supplies	(X)	1 325.9	(NA)	(NA)
971000	Materials, parts, containers, and supplies, n.s.k.[2]	(X)	457.9	(NA)	(NA)
	INDUSTRY 3629, ELECTRICAL INDUSTRIAL APPARATUS, N.E.C.				
	Materials, parts, containers, and supplies	**(X)**	**452.8**	**(X)**	**403.2**
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes, 1,000 s tons	(S)	6	(NA)	[5]
331012	Sheet and strip, do	(S)	7.2	(NA)	[5]
331013	Plates, do	(S)	7	(NA)	[5]
331015	Structural shapes, do	(S)	8	(NA)	[5]
331019	All other carbon steel mill shapes and forms, do	*1.1	1.0	(NA)	[5]
331020	Alloy steel, except stainless, do	**1.2	2.0	(NA)	[5]
	Stainless steel:				
331033	Sheet and strip, 1,000 s tons	(S)	1.8	(NA)	[5]
331050	All other stainless steel mill shapes and forms, do			(NA)	[5]
335770	Magnet wire, mil lb	(S)	10.3	*8.6	14.3
	Copper and copper-base alloy:				
335728	Bare wire for electrical conduction only, mil lb	(S)	1.4	(S)	1.6
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes, do	*4.5	6.2	1.2	1.9
335143	Plate, sheet, and strip, including military cups and discs, do	(S)	2.6	(S)	1.0
335152	Pipe and tube, do			(S)	3.3
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil, mil lb	2.6	5.0	(X)	-
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc., do	(S)	4.3	(S)	1.2
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.), do			(S)	3.1
	Insulated wire and cable, except magnet wire:				
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content), mil lb	(S)	3.7	**4.3	5.2
335793	Aluminum (quantity of aluminum content), do	(D)	(D)	-	-
	Castings (rough and semifinished):				
332011	Iron (gray and malleable), 1,000 s tons	(D)	(D)	(NA)	[5]
332045	Steel, do	(D)	(D)	(NA)	[5]
336005	Aluminum and aluminum-base alloy, mil lb	(S)	8	(NA)	[5]
336006	Copper and copper-base alloy, do	(D)	(D)	(NA)	[5]
336008	Other nonferrous, do	(D)	(D)	(NA)	[5]
	Industrial electrical control equipment (received for incorporation only into other industrial electrical control equipment shipped, as such, by this plant):				
362500	Purchased from other companies	(X)	17.8	(NA)	[5]
362501	Received from other plants of the same company			(NA)	[5]
326400	Porcelain, steatite, and other ceramic electrical products	(X)	(D)	(X)	[5]
308007	Plastics products consumed in the form of sheets, rods, tubes, and other shapes	(X)	11.6	(NA)	[5]
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., but excluding sheets, rods, tubes, and shapes, mil lb	(S)	1.2	(NA)	[5]

See footnotes at end of table.

Table 3. **Materials Consumed by Kind: 1987 and 1982**—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity[1]	Delivered cost (million dollars)	Quantity[1]	Delivered cost (million dollars)
	INDUSTRY 3629, ELECTRICAL INDUSTRIAL APPARATUS, N.E.C.—Con.				
333001	Nonferrous metal smelter and refinery shapes, including precious metal.....mil lb	(S)	3	(NA)	(5)
345001	Bolts, nuts, screws, rivets, and screw machine products	(X)	4.8	(NA)	(5)
361301	Switches, except snap, toggle and push, and circuit breakers	(X)	2.6	(NA)	(5)
362101	Electric motors, generators and parts	(X)	2.1	(NA)	(5)
344401	Sheet metal products, except stampings	(X)	2.8	(NA)	(5)
367001	Resistors, capacitors, transformers, transducers, and other electronic-type components, except electron tubes and semiconductors	(X)	21.5	(NA)	[5]9.6
970099	All other materials and components, parts, containers, and supplies	(X)	199.1	(X)	[3,5] 260.6
971000	Materials, parts, containers, and supplies, n.s.k.[2]	(X)	132.9	(X)	101.4

[1]For some establishments, data have been estimated from central unit values which are based on quantity-cost relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: * 10 to 19 percent estimated; ** 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

[2]Total cost of materials of establishments that did not report detailed materials data, including establishments that were not mailed a form.

[3]Data are included with material code 970099 to avoid disclosing data for individual companies.

[4]Industry definition is new for 1987; therefore, 1987 data for materials consumed are not comparable to prior-year data. As a result, 1982 materials consumed data are not available.

[5]For 1982, data for material codes 331011, 331012, 331013, 331015, 331019, 331020, 330133, 331050, 332011, 332045, 336005, 336006, 336008, 362500, 362501, 308007, 282104, 333001, 345001, 361301, 362101, and 344401 were not collected separately but were included with material code 970099.

[6]For 1982, data for material code 367001 included only resistors and capacitors for electronic circuitry. Data for the remainder were included in material code 970099.

APPENDIX
Scope and Coverage and Explanation of Terms

GENERAL

The 1987 Census of Manufactures is the 32nd census of manufacturing establishments conducted in the United States. For 1987, it was conducted as part of the economic censuses, which included the censuses of mineral industries, construction industries, retail and wholesale trades, service industries, selected transportation activities, and minority-owned and women-owned businesses, under authority of title 13 of the United States Code. Title 13 specifies that an economic census be conducted every 5 years to cover years ending in 2 and 7.

SCOPE AND COVERAGE

Establishment Basis of Reporting

The census of manufactures is conducted on an establishment basis. All manufacturing establishments with one paid employee or more at any time during the year are covered by the census of manufactures. Therefore, a company operating at more than one location is required to file a separate report for each location. This report excludes information for separately operated administrative offices, warehouses, garages, and other auxiliary units which service manufacturing establishments of the same company. Where these auxiliary operations are conducted at the same location as the manufacturing operation, they are usually included in the report for the operating manufacturing establishment.

Use of Administrative Records

From a universe of approximately 350,000 manufacturing establishments in the 1987 Census of Manufactures, approximately 150,000 small single-establishment companies were excused from filing reports. Selection of the small establishment nonmail cases was done on an industry-by-industry basis. A variable cutoff was used to determine those establishments for which administrative records were to be used in place of a census report. The cutoffs were selected so the administrative-record cases would account for approximately 3 percent or less of the value of shipments for the industry. These cutoffs were then adjusted so that all single-establishment companies with less than 5 employees were excluded from the mail canvass, while all establishments with more than 20 employees were included. Where establishments in the 5 to 20 employee size range were included in the mail canvass, an abbreviated census form was frequently used.

For these nonmail establishments, (and a small number of larger establishment whose reports were not received at the time the data were tabulated) data on employment, payroll, and receipts were obtained from administrative records of other government agencies rather than from census forms. The administrative-record information was then used in conjunction with industry averages to estimate the data for these establishments. The value of shipments and cost of materials were not distributed among specific products and materials but were included in the product and material "not specified by kind" (n.s.k.) categories.

EXPLANATION OF TERMS

Number of establishments and companies–A separate report was required for each manufacturing establishment (plant) with one employee or more. An establishment is defined as a single physical location where manufacturing is performed. A company, on the other hand, is defined as a business organization consisting of one establishment or more under common ownership or control.

All employees–Includes all full-time and part-time employees on the payrolls at any time during the year. Included are all persons on paid sick leave, paid holidays, and paid vacations. Officers of corporations are included as employees; proprietors and partners of unincorporated firms are excluded. The "all employees" number is the average number of production workers plus the number of other employees in mid-March. The number of production workers is the average of those for midmonth payroll periods of March, May, August, and November.

Production workers–Includes workers up through the working-supervisor level engaged in fabricating, processing, assembling, inspecting, receiving, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial, guard services, product development, auxiliary production for plant's own use (e.g., powerplant), recordkeeping, and other closely associated services. Truckdrivers delivering ready-mixed concrete are also included in production workers.

Other employees–Includes nonproduction personnel, including those engaged in the following activities: supervision above working-supervisor level, sales (including driver/salespersons), sales delivery (truckdrivers and helpers), advertising, credit collection, installation and

servicing of own product, clerical and routine office functions, executive, purchasing, finance, legal, personnel (including cafeteria, etc.), professional, and technical employees.

Payroll–Includes the gross earnings for the "employees" defined above, such as salaries, wages, commissions, dismissal pay, bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. Respondents were told that in reporting they could follow the definition of payrolls used for calculating the Federal withholding tax.

Production-worker hours–Covers hours worked or paid for at the plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave when the employee was not at the plant.

Cost of materials–Refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuels consumed, regardless of whether they were purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.

The important components of this cost item are (a) all raw materials, semifinished goods, parts, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year; (b) electric energy purchased; (c) fuels consumed for heat, power, or generating electricity; (d) work done by others on materials or parts furnished by manufacturing establishments (contract work); and (e) products bought and resold in the same condition.

Specific materials consumed (table 3)–In addition to the total cost of materials which every establishment was required to report, information was also collected for most manufacturing industries on the consumption of major materials used in manufacturing. These inquiries were restricted to those materials which were important parts of the cost of production in a particular industry and for which cost information was available from manufacturers' records. Establishments consuming less than a specified amount (usually $10,000) of a specific material were not requested to report consumption of that material separately. Also, the cost of materials for the small establishments for which administrative records were used was estimated as "not specified by kind" (n.s.k.).

Value of shipments and other receipts–Generally refers to received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all miscellaneous receipts such as receipts for contract work performed for others, installation and repair receipts, sale of scrap, and sale of products bought and resold without further processing. Included are all items made by or for the establishment from materials owned by it whether sold, transferred to other plants of the same company, or shipped on consignment. The net selling value of products made in one plant on a contract basis from materials owned by another was reported by the plant providing the materials.

In a few industries, the value of production or value of work completed is used instead of value of shipments. These industries are identified in the introduction and are footnoted in table 1.

In the case of multiunit companies, the manufacturer was requested to report the value of products transferred to other establishments of the same company at full economic or commercial value, that is, including not only the direct costs of production but also a reasonable proportion of "all other costs" (including company overhead and profit).

Shipments or production of individual products (table 2)–In the 1987 census, detailed shipment information was collected for approximately 11,000 individual products. These products are identified by a seven-digit code and are grouped into approximately 1,500 classes of products, which in turn are primary to 459 four-digit industries. Data at the five-digit product-class level have been collected each year as part of the annual survey of manufactures. Information at the seven-digit level, collected for many industries in the current industrial reports program, is not included in this table.

Value added by manufacture–This measure of manufacturing activity is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments for products manufactured plus receipts for services rendered. The result of this calculation is then adjusted by the addition of value added by merchandising operations (that is, the difference between the sales value and cost of merchandise sold without further manufacturing, processing, or assembly) plus the net change in finished goods and work-in-process inventories between the beginning and end of the year.

For those industries where value of production is collected instead of value of shipments (see footnote in table 1), value added is adjusted only for the change in work-in-process inventories between the beginning and end of the year. For those industries where value of work done is collected, the value added does not include an adjustment for the change in finished goods or work-in-process inventories.

Value added avoids the duplication in the figure for value of shipments which results from the use of products of some establishments as materials by others. Value

added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

Expenditures for new plant and equipment–Establishments in operation and any known plants under construction were asked to report their expenditures for (a) permanent additions and major alterations to manufacturing establishments and (b) new machinery and equipment used for replacement and additions to plant capacity if they are of the type for which depreciation accounts are ordinarily maintained.

These totals exclude expenditures for used plant and equipment, expenditures for land, and cost of maintenance and repairs charged as current operating expenses. Data for used plant and equipment will be published in the final industry bulletin.

End-of-year inventories–Comprised of (a) finished products; (b) work-in-process; and (c) materials, supplies, fuels, etc. Beginning in 1982, respondents were asked to report their inventories at (the lower of) cost or market prior to adjustment to LIFO cost. This is a change from prior years in which respondents were permitted to value their inventories using any generally accepted accounting method. Therefore, 1982 through 1987 data for inventories are not strictly comparable to prior-year data.

Specialization and coverage ratios–An establishment is classified in a particular industry if its shipments of primary products of the industry exceed in value its shipments of the products of any other single industry. An establishments' shipments include those products assigned to an industry (primary products), those considered primary to other industries (secondary products), and receipts for miscellaneous activities (merchandising, contract work, resales, etc.). The following ratios have been developed to measure the relationship of primary product shipments to the data on shipments for the industry shown in table 1 and data on product shipments shown in table 2.

Specialization ratio–Represents the ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for the establishments classified in the industry.

Coverage ratio–Represents the ratio of primary products shipped by the establishments classified in the industry to the total shipments of such products that are shipped by all manufacturing establishments, wherever classified.